



RECEIVED  
18 MAR 2004  
Ans'd



INVESTOR IN PEOPLE

PN - JP2000318249 A 20001121

PD - 2000-11-21

PR - JP19990127406 19990507

OPD- 1999-05-07

TI - PRINTER WITH FUNCTION OF CORRECTING PRINTING START POSITION DEVIATION

IN - YOKOYAMA TOMOYUKI

PA - FUJITSU TAKAMISAWA COMPONENT

IC - B41J21/00 ; B41J2/51 ; B41J21/16

© WPI / DERWENT

TI - Printer for automatic cash delivery machine, has compensation unit which corrects printing start position by comparing actual and set mark detection time during calibration mode

PR - JP19990127406 19990507

PN - JP2000318249 A 20001121 DW200107 B41J21/00 007pp

PA - (FUJI-N) FUJITSU TAKAMIZAWA COMPONENT KK

IC - B41J2/51 ; B41J21/00 ; B41J21/16

AB - JP2000318249 NOVELTY - A detector detects mark on the paper during conveyance. The pulse of detection signal is compared with threshold value, to recognize leading and trailing edges of mark during printing mode. A detector determines paper sending time relevant to edge detection result. A compensation unit corrects the printing start position, based on comparison of mark detection time and preset time, during calibration mode.

- USE - For automatic cash delivery machine.

- ADVANTAGE - By ensuring automatic printing start position correction, positional offset of paper is eliminated.

- DESCRIPTION OF DRAWING(S) - The figure shows the block diagram of control circuit of printer.

- (Dwg.5/10)

OPD- 1999-05-07

AN - 2001-056037 [07]

© PAJ / JPO

PN - JP2000318249 A 20001121

PD - 2000-11-21

AP - JP19990127406 19990507

IN - YOKOYAMA TOMOYUKI

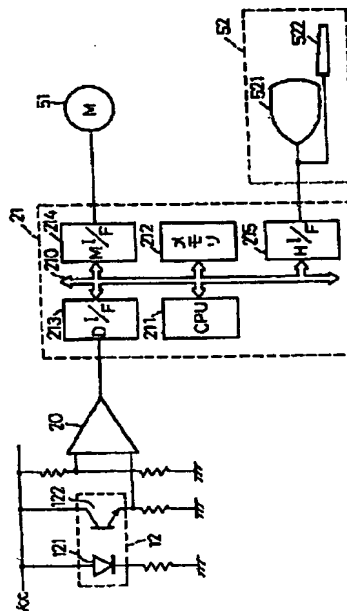
PA - FUJITSU TAKAMISAWA COMPONENT LTD

TI - PRINTER WITH FUNCTION OF CORRECTING PRINTING START POSITION DEVIATION

AB - PROBLEM TO BE SOLVED: To automatically solve a deviation by setting a detecting means for detecting a mark of a predetermined length printed in a paper feed direction of a printing paper, measuring a mark detect time by a correction mode operation when a printing position deviates, and correcting in accordance with a deviation from a reference time.

- SOLUTION: When a motor is driven to start sending a paper to print data, an output of a photocell 12 is started to be read. Whether or not a rise is detected at this time, that is, whether or not a rear edge of a mark 11 preliminarily printed to the printing paper is detected is judged. When it is judged affirmatively, a counter is started to measure an actual feed amount of the printing paper after the rear end of the mark is detected. The motor is stopped to stop the paper transfer when the count value reaches a predetermined value. When a maintenance person judges that the printing deviates, a correction process is started. A length of the mark 11 is measured, a deviation of the actual count value of the counter from a standard value is calculated, a correction value is obtained, and a deviation of a printing start position is corrected.

I - B41J21/00 ; B41J2/51 ; B41J21/16



## 【特許請求の範囲】

【請求項1】 印刷紙の紙送り方向に印刷されている予め定められた長さのマークを検出する検出手段と、前記検出手段の出力を閾値と比較してパルス化するパルス化手段と、

印刷モード動作中に、前記パルス化手段の出力に基づいてマークの前縁又は後縁を検出する縁検出手段と、印刷モード動作中に、前記縁検出手段により前縁又は後縁が検出されてから紙送り時間紙送りして所定位置を決定する位置決定手段と、

校正モード動作中に、前記比較手段の出力に基づいてマーク検出時間を決定し、該マーク検出時間と予め定められた基準時間との比較結果に基づいて前記位置決定手段によって決定される印刷開始位置のズレを補正する補正手段と、を具備する印刷開始位置ズレ補正機能付プリンタ。

【請求項2】 前記補正手段が、校正モード動作中に、前記パルス化手段の出力に基づいてマーク検出時間を決定し、該マーク検出時間と予め定められた基準時間との比較結果に基づいて前記位置決定手段による後縁が検出されてからの紙送り時間を補正する請求項1に記載の印刷開始位置ズレ補正機能付プリンタ。

【請求項3】 前記補正手段が、校正モード動作中に、前記パルス化手段の出力に基づいてマーク検出時間を決定し、該マーク検出時間と予め定められた基準時間との比較結果に基づいて前記パルス化手段の閾値を補正する請求項1に記載の印刷開始位置ズレ補正機能付プリンタ。

【請求項4】 前記検出手段の稼働時間を累積する稼働時間累積手段をさらに具備し、前記補正手段が、校正モード動作中に、前記稼働時間累積手段で累積された稼働時間に基づいて前記位置決定手段によって決定される印刷開始位置のズレを補正する請求項1に記載の印刷開始位置ズレ補正機能付プリンタ。

【請求項5】 前記補正手段が、校正モード動作中に、前記稼働時間累積手段で累積された稼働時間に基づいて前記位置決定手段による後縁が検出されてからの紙送り時間を補正する請求項4に記載の印刷開始位置ズレ補正機能付プリンタ。

【請求項6】 前記補正手段が、校正モード動作中に、前記稼働時間累積手段で累積された稼働時間に基づいて前記パルス化手段の閾値を補正する請求項4に記載の印刷開始位置ズレ補正機能付プリンタ。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明はプリンタに係わり、特に、印刷開始位置のズレを自動補正することの可能なプリンタに関する。

【0002】

【従来の技術】近年自動現金受渡し機等にはプリンタが

搭載され、顧客の取引明細を印刷して顧客に提供している。この場合、印刷項目は、例えば自動現金受渡し機においては取引日時、取引金額、残高等のように予め決定されているため、予め所定の枠が印刷された印刷紙に取引日時、取引金額、残高等をデータとして挿入印刷することが一般的である。

【0003】従って、枠内の所定位置にデータが挿入印刷されない場合は、顧客に悪印象を与えるだけでなく、データが読み取れない場合もある。そこで、挿入印刷位置を正確に決定するために、印刷紙に所定のマークを印刷しておき、このマークから予め定められた距離だけ紙送りしてデータを挿入印刷する。

【0004】図1はマーク検出方法の説明図であって、(イ)は上面図、(ロ)は側面図である。印刷紙10の一方の側端には長さ $L_0$ のマーク11が、間隔 $L_1$ おきに印刷されている。なお、印刷紙10の上方にはマーク11を光学的に検出するためにフォトセル12が設置されている。

【0005】フォトセル12には、光を放射するフォトダイオード121と、フォトダイオード121から放射され印刷紙10で反射された光を検出するフォトトランジスタ122とが一体に組み込まれている。図2はマーク検出回路の回路図であって、フォトダイオード121のアノードは5Vバス $V_{CC}$ に接続され、カソードは抵抗素子を介して接地される。また、フォトダイオード121のコレクタは5Vバス $V_{CC}$ に接続され、エミッタは抵抗素子を介して接地される。

【0006】フォトトランジスタ122のエミッタはオペアンプ20の一方の入力端子にも接続されている。オペアンプ20の他方の入力端子には、抵抗分割回路で生成される閾値電圧が印加され、オペアンプ20はコンパレータとして機能する。オペアンプ20の出力は、マイコン21に印加される。図3はマーク検出時の波形図であって、縦軸は電圧を、横軸は時間を表す。また、実線はフォトセル12の出力を、破線はオペアンプ20の出力を示す。

【0007】即ち、フォトセル12の出力は、フォトセル12の走査位置が印刷紙10のマークのない領域からマーク領域に、逆にマーク領域からマークのない領域に遷移するに応じて緩やかに変化する。また、マーク領域を走査している間もフォトトランジスタ122には漏れ電流が流れるためフォトセル12の出力は完全には零とはならない。

【0008】そこでマーク領域を確実に検出するためにコンパレータで波形形成する。例えばオペアンプ20の他方の入力端子に印加される閾値電圧を3Vに設定した場合には、フォトセル12の出力が3V以上であればオペアンプ20の出力は高レベルとなり、フォトセル12の出力が3V以下であればオペアンプ20の出力は低レベルとなる。

【0009】従って、オペアンプ20から低レベルが出力されている時間をマイコン21で計測し、低レベルが出力されている時間が所定の範囲にあるときにマークを検出したと見做すことができる。そして、例えば、マークの後縁を検出したとき、即ち、オペアンプ20から出力されるパルスの立ち上がりを検出したときから、印刷紙を所定量送った位置をデータ印刷開始位置とすることにより、印刷ズレを防止することができる。

【0010】

【発明が解決しようとする課題】しかしながら、フォトセルには製造時のバラツキが存在するだけでなく、経時的にも劣化してパルスの立ち上がり検出時期が変動すると、コンパレータの閾値電圧、および、マーク後縁検出後の紙送り量を一定値に固定した場合には印刷開始位置も変動し、印刷ズレが発生することを回避できない。

【0011】図4は課題の説明図であって、(イ)はフォトセル12の出力であり、実線はフォトセル12が劣化していない場合の出力、破線はフォトセル12が劣化した場合の出力である。そしてパルスの立ち上がり端が検出されてから、距離しだけ紙送りした位置を印刷開始位置とすると、フォトセル12の劣化によって印刷開始位置のズレが発生する。

【0012】本発明は、上記課題に鑑みなされたものであって、印刷開始位置のズレを自動補正することの可能なプリンタを提供することを目的とする。

【0013】

【課題を解決するための手段】第1の発明に係る印刷開始位置ズレ補正機能付プリンタは、印刷紙の紙送り方向に印刷されている予め定められた長さのマークを検出する検出手段と、検出手段の出力を閾値と比較してパルス化するパルス化手段と、印刷モード動作中にパルス化手段の出力に基づいてマークの前縁又は後縁を検出する縁検出手段と、印刷モード動作中に縁検出手段により前縁又は後縁が検出されてから紙送り時間紙送りして所定位置を決定する位置決定手段と、校正モード動作中に比較手段の出力に基づいてマーク検出時間を決定し該マーク検出時間と予め定められた基準時間との比較結果に基づいて位置決定手段によって決定される印刷開始位置のズレを補正する補正手段と、を具備する。

【0014】本発明にあっては、マークの前縁又は後縁の検出後所定時間紙送りした位置と印刷開始位置との間にズレが生じたときに、校正モードを実行し、マーク検出時間と予め定められた基準時間との比較結果に応じて印刷開始位置が補正される。第2の発明に係る印刷開始位置ズレ補正機能付プリンタは、補正手段が、校正モード動作中に、パルス化手段の出力に基づいてマーク検出時間を決定しマーク検出時間と予め定められた基準時間との比較結果に基づいて位置決定手段による後縁が検出されてからの紙送り時間を補正する。

【0015】本発明にあっては、マーク検出時間と予め

定められた基準時間との比較結果に応じて後縁が検出されてからの紙送り時間を補正することによって印刷開始位置が補正される。第3の発明に係る印刷開始位置ズレ補正機能付プリンタは、補正手段が、校正モード動作中に、パルス化手段の出力に基づいてマーク検出時間を決定しマーク検出時間と予め定められた基準時間との比較結果に基づいてパルス化手段の閾値を補正する。

【0016】本発明にあっては、マーク検出時間と予め定められた基準時間との比較結果に応じてパルス化手段の閾値を補正することによって印刷開始位置が補正される。第4の発明に係る印刷開始位置ズレ補正機能付プリンタは、検出手段の稼働時間を累積する稼働時間累積手段をさらに具備し、補正手段が校正モード動作中に稼働時間累積手段で累積された稼働時間に基づいて位置決定手段によって決定される印刷開始位置のズレを補正する。

【0017】本発明にあっては、マークの前縁又は後縁の検出後所定時間紙送りした位置と印刷開始位置との間にズレが生じたときに、校正モードを実行し、検出手段の累積稼働時間に応じて印刷開始位置が補正される。第5の発明に係る印刷開始位置ズレ補正機能付プリンタは、補正手段が、校正モード動作中に、稼働時間累積手段で累積された稼働時間に基づいて位置決定手段による後縁が検出されてからの紙送り時間を補正する。

【0018】本発明にあっては、検出手段の累積稼働時間に応じて後縁が検出されてからの紙送り時間を補正することによって印刷開始位置が補正される。第6の発明に係る印刷開始位置ズレ補正機能付プリンタは、補正手段が、校正モード動作中に、稼働時間累積手段で累積された稼働時間に基づいてパルス化手段の閾値を補正する。

【0019】本発明にあっては、検出手段の累積稼働時間に応じてパルス化手段の閾値を補正することによって印刷開始位置が補正される。

【0020】

【発明の実施の形態】図5は本発明に係る第1の印刷開始位置ズレ補正機能付プリンタの制御回路の構成図であって、従来と同じくフォトセル12、オペアンプ20、ならびにマイコン21を具備する。即ち、フォトセル12内の発光素子であるフォトダイオード121のアノードは直流バスV<sub>cc</sub>に接続され、カソードは抵抗を介して接地される。また、受光素子であるフォトトランジスタ122のコレクタは直流バスV<sub>cc</sub>に接続され、エミッタは抵抗を介して接地されるとともに、コンパレータとして機能するオペアンプ20の一方の入力端子にも接続される。また、オペアンプ20の他方の入力端子には抵抗分割回路で発生される閾値電圧が印加される。

【0021】マイコン21はバス210を中心として、CPU211、メモリ212、ディジタルインターフェイス(DI/F)213、モータインターフェイス(M

I/F) 214、およびヒューマンインターフェイス (HI/F) 215を具備している。そして、オペアンパ20の出力はDI/F 213を介してマイコン21に取り込まれ、マイコン21はMI/F 214を介して印刷紙送り用のモータ51を制御する。

【0022】また、マイコン21はHI/F 215を介して保守ツール52と接続可能であり、各種の保守に使用される。なお、保守ツール52は、例えば、ディスプレイ521とキーボード522とで構成される。また、保守ツール52は、常設されている必要はなく、必要に応じて接続可能であればよい。図6はマイコン21で実行される第1の紙送りルーチンのフローチャートであって、印刷要求が発生するたびに割り込み処理として実行される。

【0023】即ち、ステップ60でモータ51を起動して紙送りを開始し、ステップ61でデータを印刷する。さらに、ステップ62でフォトセル12の出力の読み取りを開始する。ステップ63で立ち上がりが出たか、即ち、印刷紙に予め印刷されているマークの後縁が検出されたかを判定する。

【0024】ステップ63で否定判定されたとき、即ち、マークの後縁が検出されないときはステップ62に戻り、フォトセル12の出力の読み取りを続行する。逆に、ステップ63で肯定判定されたとき、即ち、マークの後縁が検出されたときは、ステップ64に進み、マーク後縁検出後の実際の印刷紙の送り量を測定するためにカウンタを起動する。

【0025】ステップ65でカウンタのカウンタ値が所定値に到達したかを判定する。所定値はマーク後縁検出後の印刷紙の送り量の規定値に対応して決定される値であり、基準所定値と補正值との和として定義される。ここで、基準所定値は、例えば、マーク後縁から10mmの位置を印刷開始位置とする場合には、印刷紙送り速度が30mm/秒であるとするれば、 $10/30=0.333$ 秒に設定される。

【0026】補正值は、フォトセル12のバラツキあるいは経時劣化を補正するためのものであり、詳細は後述する。ステップ65でカウンタのカウンタ値が所定値に到達するまで待機し、所定値に到達するとステップ66に進み、モータ51を停止して紙送りを停止する。最後にステップ67でカウンタをリセットしてこのルーチンを終了する。

【0027】図7は、例えば保守員が印刷ずれが発生していると判断したときに、保守員が保守ツール52を使用して起動する第1の補正ルーチンのフローチャートである。即ち、ステップ70で印刷紙送りを開始し、ステップ71でフォトセル12の出力の読み取りを開始する。そして、ステップ72で立ち下がりが出たか、即ち、マークの前縁が検出されたかを判定する。

【0028】ステップ72で否定判定されたとき、即

ち、マークの前縁が検出されないときはステップ71に戻り、マークの前縁の検出を続行する。逆に、ステップ72で肯定判定されたとき、即ち、マークの前縁が検出されたときは、ステップ73に進み、マークの長さを測定するためにカウンタを起動する。ステップ74で立ち上がりが出たか、即ち、マークの後縁が検出されたかを判定する。

【0029】ステップ74でマークの後縁が検出されるまで待機し、マークの前縁が検出されたときは、ステップ75でカウンタを停止する。ステップ76でカウンタの実際の係数値 $C_1$ と予め定められている標準値 $C_2$ とのカウンタ差 $\Delta$ を次式に基づき算出する。

$$\Delta = C_2 - C_1$$

ここで、標準値は、例えば、マーク長さが10mmである場合には、印刷紙送り速度が30mm/秒であるとするれば、 $10/30=0.333$ 秒に設定される。

【0030】いま、カウンタの実際の係数値 $C_1$ が0.3秒であったと仮定すると、カウンタ差は、

$$\Delta = 0.333 - 0.3 = 0.033$$

となる。ステップ77でカウンタ差 $\Delta$ を独立変数とする予め定められた関数を使用して補正值を求める。

【0031】即ち、上述の場合、カウンタ差( $=0.033$ 秒)の間に印刷紙は30mm/秒 $\times 0.033$ 秒 $=1$ mm送られるので、フォトセル12のバラツキあるいは経時変化により、本来10mmの長さのマークが9mmと実際より短く計測されたこととなる。ここで、フォトセル12のバラツキあるいは経時劣化の影響が前縁および後縁において均等に発生すると仮定すると、本来後縁から10mmの印刷開始位置は0.5mm前にずれることとなる。従って、後縁検出後の紙送り量を10.5mmとすれば印刷開始位置は正規の位置となるので、補正值を印刷紙を0.5mm送るのに要する時間 $=0.017$ とすればよい。

【0032】この場合補正值 $=0.017=0.033/2$ となるので、カウンタ差 $\Delta$ を独立変数とする予め定められた関数 $f(\Delta)$ は以下のように定義される。

$$f(\Delta) = \Delta/2$$

最後にステップ78で、

所定値  $\leftarrow$  基準所定値 + 補正值  
としてこのルーチンを終了する。

【0033】フォトセル12の経時劣化は、使用累積時間の関数としてメーカーから提供される場合もあるので、補正值を使用累積時間の関数として決定することも可能である。図8は第2の紙送りルーチンのフローチャートであって、第1の紙送りルーチンのステップ63とステップ64の間にフォトセルの累計使用時間 $T_{ac}$ を算出するステップ80を設ける。

【0034】なお、ステップ62の前にフォトセルをオンとするステップ、立ち上がりエッジ検出後にフォトセルをオフとするステップをさらに追加してもよい。図9

は第2の補正ルーチンのフローチャートであって、ステップ90で補正値を累計使用時間 $T_{ac}$ を独立変数とする予め定められた関数 $g$ によって求めてこのルーチンを終了する。

【0035】補正値 ←  $g(T_{ac})$

上記では、後縁検出後の紙送り量を補正することとしているが、後縁検出後の紙送り量に代えてコンパレータ20の閾値電圧を調整するようにしてもよい。図10はコンパレータ20の閾値電圧を補正する場合に使用される第2の紙送り量補正機能付プリンタの制御回路の構成図であって、補正値に対応した閾値電圧がD1/F213を介してオペアンプ20の他方に入力端子に出力される。

【0036】この構成により、フォトセルで検出されマイコン21に読み込まれるマーク長が常に予め定められた長さ（例えば10mm）となるように、閾値電圧が調整される。

【0037】

【発明の効果】第1ないし第3の発明に係る位置ズレ補正機能付プリンタによれば、印刷位置ズレが発生したときに、校正モード動作でマーク検出時間を測定し、基準時間からのズレに応じた補正を行うことにより、ズレを解消することが可能となる。第4ないし第6の発明に係る印刷開始位置ズレ補正機能付プリンタによれば、印刷位置ズレが発生したときに、校正モード動作で検出手段

の累積稼働時間に応じた補正を行うことにより、ズレを解消することが可能となる。

【図面の簡単な説明】

【図1】マーク検出方法の説明図である。

【図2】マーク検出回路の回路図である。

【図3】マーク検出時の波形図である。

【図4】課題の説明図である。

【図5】本発明に係る第1の印刷開始位置ズレ補正機能付プリンタの制御回路の構成図である。

【図6】第1の紙送りルーチンのフローチャートである。

【図7】第1の補正ルーチンのフローチャートである。

【図8】第2の紙送りルーチンのフローチャートである。

【図9】第2の補正ルーチンのフローチャートである。

【図10】本発明に係る第2の印刷開始位置ズレ補正機能付プリンタの制御回路の構成図である。

【符号の説明】

12…フォトセル

121…フォトダイオード

122…フォトトランジスタ

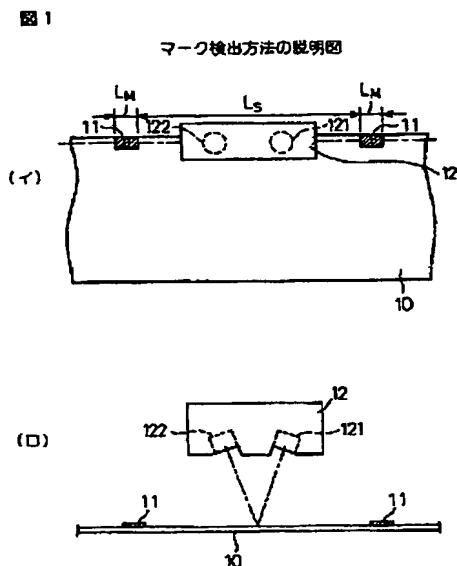
20…オペアンプ

21…マイコン

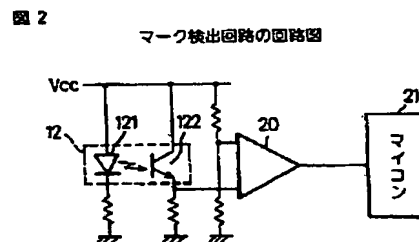
51…モータ

52…保守ツール

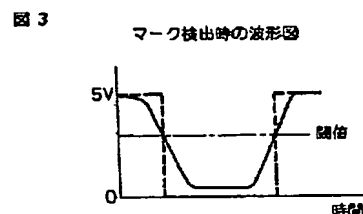
【図1】



【図2】

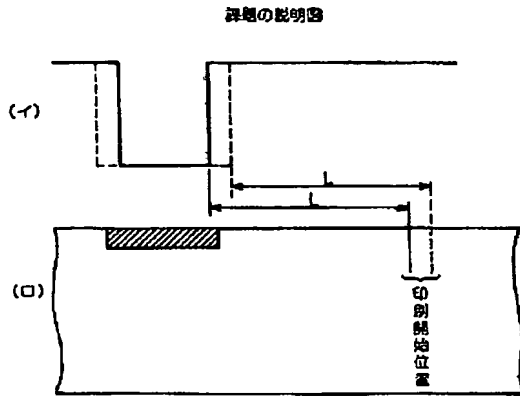


【図3】



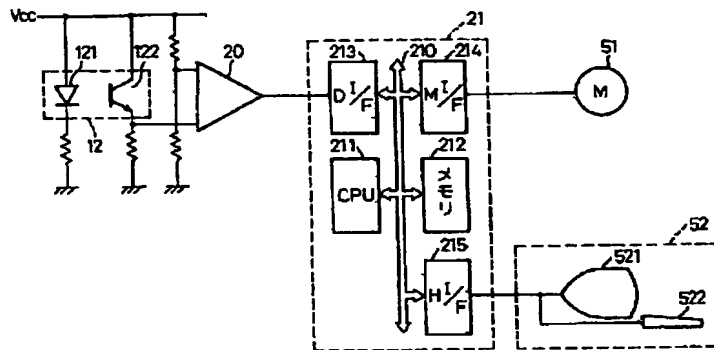
【図4】

図4



【図5】

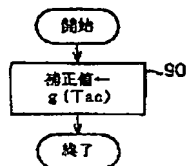
第1の印刷開始位置ズレ補正機能付プリンタの制御回路の構成図



【図9】

図8

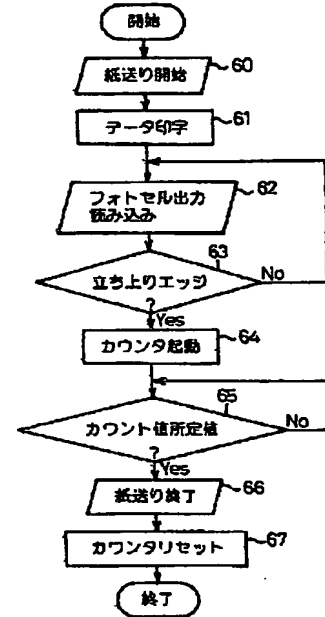
第2の補正ルーチンのフローチャート



【図6】

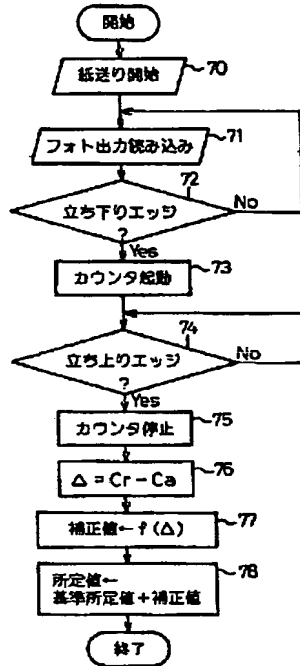
図6

第1の紙送りのルーチンのフローチャート



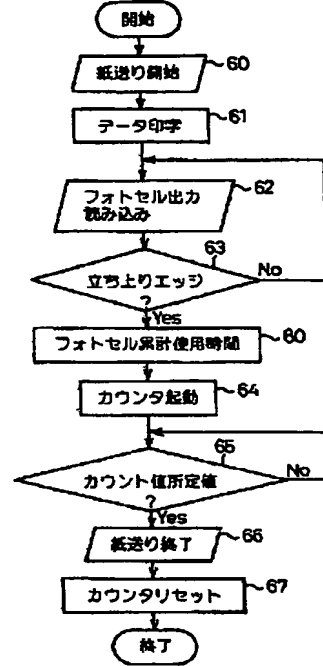
【図7】

図7 第1の補正ルーチンのフローチャート



【図8】

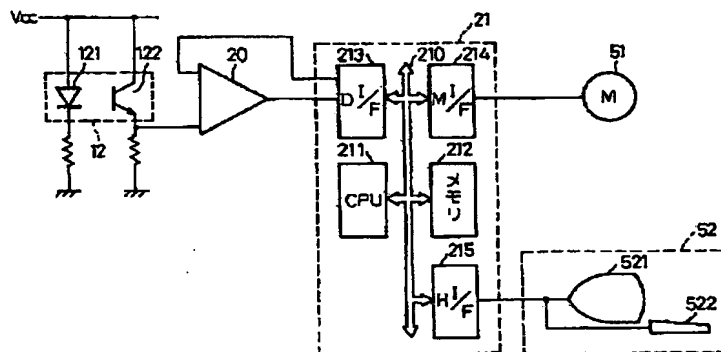
図8 第2の紙送りルーチンのフローチャート



【図10】

第2の印刷開始位置ズレ補正機能付プリンタの制御回路の構成図

図10





# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-318249

(43)Date of publication of application : 21.11.2000

(51)Int.Cl.

B41J 21/00

B41J 2/51

B41J 21/16

(21)Application number : 11-127406

(71)Applicant : FUJITSU TAKAMISAWA  
COMPONENT LTD

(22)Date of filing : 07.05.1999

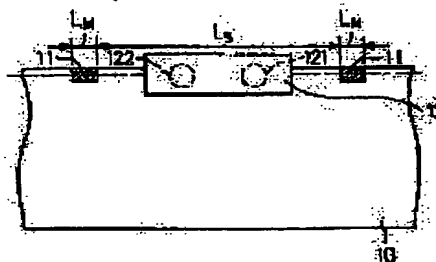
(72)Inventor : YOKOYAMA TOMOYUKI

(54) PRINTER WITH FUNCTION OF CORRECTING PRINTING START POSITION  
DEVIATION

(57)Abstract:

PROBLEM TO BE SOLVED: To automatically solve a deviation by setting a detecting means for detecting a mark of a predetermined length printed in a paper feed direction of a printing paper, measuring a mark detect time by a correction mode operation when a printing position deviates, and correcting in accordance with a deviation from a reference time.

SOLUTION: When a motor is driven to start sending a paper to print data, an output of a photocell 12 is started to be read. Whether or not a rise is detected at this time, that is, whether or not a rear edge of a mark 11 preliminarily printed to the printing paper is detected is judged. When it is judged affirmatively, a counter is started to measure an actual feed amount of the printing paper after the rear end of the mark is detected. The motor is stopped to stop the paper transfer when the count value reaches a predetermined value. When a maintenance person judges that the printing deviates, a correction process is started. A length of the mark 11 is measured, a deviation of the actual count value of the counter from a standard value is calculated, a correction value is obtained, and a deviation of a printing start position is corrected.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

Copyright (C); 1998,2003 Japan Patent Office

## \* NOTICES \*

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

DETAILED DESCRIPTION

---

## [Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the possible printer of carrying out automatic amendment of the gap of a printing starting position with respect to a printer.

[0002]

[Description of the Prior Art] Automatic cash delivery is carried out in recent years, a printer is carried in an opportunity, a customer's schedule of transactions is printed, and it provides for a customer. in this case, a print item -- for example, since automatic cash delivery is carried out and it is beforehand determined like dealings time, the dealings amount of money, and the balance in the opportunity, it is common to carry out insertion printing to the printing paper with which the predetermined frame was printed beforehand, using dealings time, the dealings amount of money, the balance, etc. as data.

[0003] Therefore, when insertion printing of the data is not carried out in a predetermined location within the limit, it not only gives a customer a bad impression, but it may be unable to read data. Then, in order to determine the insertion printing position as accuracy, the predetermined mark is printed to printing paper, paper feed only of the distance beforehand defined from this mark is carried out, and it carries out insertion printing of the data.

*Prior art*

[0004] Drawing 1 is the explanatory view of the mark detection approach, (b) is a plan and (b) is a side elevation. In one side edge of printing paper 10, it is die length LM. A mark 11 is spacing LS. It is printed by setting. In addition, in order to detect a mark 11 optically, the photo cell 12 is installed above printing paper 10.

[0005] The photodiode 121 which emits light to a photo cell 12, and the photo transistor 122 which detects the light which was emitted from the photodiode 121 and reflected with printing paper 10 are included in one. Drawing 2 is the circuit diagram of a mark detection circuit, the anode of a photodiode 121 is connected to 5V bus VCC, and a cathode is grounded through a resistance element. Moreover, the collector of a photodiode 121 is connected to 5V bus VCC, and an emitter is grounded through a resistance element.

[0006] The emitter of a photo transistor 122 is connected also to one input terminal of an operational amplifier 20. The threshold voltage generated in a resistance dividing network is impressed to the input terminal of another side of an operational amplifier 20, and an operational amplifier 20 functions on it as a comparator. The output of an operational amplifier 20 is impressed to a microcomputer 21. Drawing 3 is a wave form chart at the time of mark detection, an axis of ordinate expresses an electrical potential difference, and an axis of abscissa expresses time amount. Moreover, a continuous line shows the output of a photo cell 12, and a broken line shows the output of an operational amplifier 20.

[0007] That is, to a mark field, from a mark field, the output of a photo cell 12 responds changing to a field without a mark, and changes from a field without the mark of the scan location of a photo cell 12 of printing paper 10 to reverse gently. Moreover, since the leakage current flows to a photo transistor 122 also while scanning the mark field, the output of a photo cell 12 does not serve as zero thoroughly.

[0008] Then, in order to detect a mark field certainly, corrugating is carried out with a comparator. For example, when the threshold voltage impressed to the input terminal of another side of an

operational amplifier 20 is set as 3V, if the output of a photo cell 12 is more than 3V, the output of an operational amplifier 20 will serve as a high level, and if the output of a photo cell 12 is less than [ 3V ], the output of an operational amplifier 20 will serve as a low.

[0009] Therefore, the time amount to which the low is outputted from the operational amplifier 20 is measured with a microcomputer 21, and when the time amount to which the low is outputted is in the predetermined range, it can be considered that the mark was detected. And for example, when the trailing edge of a mark is detected (i.e., when the standup of the pulse outputted from an operational amplifier 20 is detected), printing gap can be prevented from from by making a specified quantity \*\*\*\*\* location into a data printing starting position for printing paper.

[0010]

[Problem(s) to be Solved by the Invention] However, if the variation at the time of manufacture not only exists in a photo cell, but it deteriorates also with time and the standup detection stage of a pulse is changed, when the threshold voltage of a comparator and the amount of paper feeds after mark trailing-edge detection are fixed to constant value, a printing starting position is also changed, and it cannot avoid that printing gap occurs.

[0011] Drawing 4 is the explanatory view of a technical problem, (b) is the output of a photo cell 12, and an output when, as for a continuous line, the photo cell 12 has not deteriorated, and a broken line are outputs when a photo cell 12 deteriorates. And if the location which carried out paper feed only of the distance L is made into a printing starting position after the standup edge of a pulse is detected, gap of a printing starting position will occur by degradation of a photo cell 12. *Prob.*

[0012] This invention is made in view of the above-mentioned technical problem, and aims at offering the possible printer of carrying out automatic amendment of the gap of a printing starting position.

[0013]

[Means for Solving the Problem] The printer with a printing starting position gap amendment function concerning the 1st invention A detection means to detect the mark of the die length which is printed in the direction of paper feed of printing paper and which was defined beforehand, A pulse-ized means to pulse-ize the output of a detection means as compared with a threshold, and a marginal detection means to detect the first transition or the trailing edge of a mark based on the output of a pulse-ized means during print mode actuation, The positioning means which carries out paper feed time amount paper feed, and determines a predetermined location after first transition or a trailing edge is detected by the marginal detection means during print mode actuation, An amendment means to amend gap of the printing starting position determined by the positioning means based on a comparison result with the conventional time which decided on mark detection time amount based on the output of a comparison means, and was beforehand determined as this mark detection time amount during proofreading mode actuation is provided.

[0014] If it is in this invention, when gap arises between the locations and printing starting positions which carried out after [ detection ] predetermined time paper feed in the first transition of a mark, or a trailing edge, proofreading mode is performed and a printing starting position is amended according to a comparison result with the conventional time beforehand determined as mark detection time amount. The printer with a printing starting position gap amendment function concerning the 2nd invention amends the paper feed time amount after a positioning means \*\*\*\* trailing edge is detected based on a comparison result with the conventional time by which the amendment means decided on mark detection time amount based on the output of a pulse-ized means, and was beforehand determined as mark detection time amount during proofreading mode actuation.

[0015] If it is in this invention, a printing starting position is amended by amending the paper feed time amount after a trailing edge is detected according to a comparison result with the conventional time beforehand determined as mark detection time amount. The printer with a printing starting position gap amendment function concerning the 3rd invention amends the threshold of a pulse-ized means based on a comparison result with the conventional time by which the amendment means decided on mark detection time amount based on the output of a pulse-ized means, and was beforehand determined as mark detection time amount during proofreading mode actuation.

[0016] If it is in this invention, a printing starting position is amended by amending the threshold of

a pulse-ized means according to a comparison result with the conventional time beforehand determined as mark detection time amount. The printer with a printing starting position gap amendment function concerning the 4th invention possesses further an operating-time accumulation means to accumulate the operating time of a detection means, and amends gap of the printing starting position where an amendment means is determined by the positioning means based on the operating time accumulated with the operating-time accumulation means during proofreading mode actuation.

[0017] If it is in this invention, when gap arises between the locations and printing starting positions which carried out after [ detection ] predetermined time paper feed in the first transition of a mark, or a trailing edge, proofreading mode is performed and a printing starting position is amended according to the accumulation operating time of a detection means. The printer with a printing starting position gap amendment function concerning the 5th invention amends the paper feed time amount after a positioning means \*\*\*\* trailing edge is detected based on the operating time when the amendment means was accumulated with the operating-time accumulation means during proofreading mode actuation.

[0018] If it is in this invention, a printing starting position is amended by amending the paper feed time amount after a trailing edge is detected according to the accumulation operating time of a detection means. The printer with a printing starting position gap amendment function concerning the 6th invention amends the threshold of a pulse-ized means based on the operating time when the amendment means was accumulated with the operating-time accumulation means during proofreading mode actuation.

[0019] If it is in this invention, a printing starting position is amended by amending the threshold of a pulse-ized means according to the accumulation operating time of a detection means.

[0020]

[Embodiment of the Invention] Drawing 5 is the block diagram of the control circuit of the 1st printer with a printing starting position gap amendment function concerning this invention, and possesses a photo cell 12, an operational amplifier 20, and a microcomputer 21 as well as the former. That is, the anode of the photodiode 121 which is a light emitting device in a photo cell 12 is connected to the direct-current bus Vcc, and a cathode is grounded through resistance. Moreover, the collector of the photo transistor 122 which is a photo detector is connected to the direct-current bus Vcc, and an emitter is connected also to one input terminal of the operational amplifier 20 which functions as a comparator while it is grounded through resistance. Moreover, the threshold voltage generated in a resistance dividing network is impressed to the input terminal of another side of an operational amplifier 20.

[0021] The microcomputer 21 possesses CPU211, memory 212, the digital interface (DI/F) 213, the motor interface (MI/F) 214, and the human interface (HI/F) 215 centering on a bus 210. And the output of an operational amplifier 20 is incorporated by the microcomputer 21 through DI/F213, and a microcomputer 21 controls the motor 51 for printing paper delivery through MI/F214.

[0022] Moreover, through HI/F215, a maintenance tool 52 and connection are possible for a microcomputer 21, and it is used for various kinds of maintenance. In addition, a maintenance tool 52 consists of a display 521 and a keyboard 522. Moreover, a maintenance tool 52 does not need to be established permanently, and if it is connectable if needed, it is good. Drawing 6 is the flow chart of the 1st paper feed routine performed with a microcomputer 21, and whenever a printing demand occurs, it is performed as interruption processing.

[0023] That is, a motor 51 is started at step 60, paper feed is started, and data are printed at step 61. Furthermore, reading of the output of a photo cell 12 is started at step 62. It judges whether the standup was detected at step 63, i.e., was the trailing edge of the mark currently beforehand printed by printing paper detected?

[0024] When a negative judging is carried out at step 63 (i.e., when the trailing edge of a mark is not detected), reading of the output of return and a photo cell 12 is continued to step 62. On the contrary, when an affirmation judging is carried out at step 63 (i.e., when the trailing edge of a mark is detected), it progresses to step 64, and a counter is started in order to measure the feed per revolution of the actual printing paper after mark back end detection.

[0025] It judges whether the counted value of a counter reached the predetermined value at step 65.

A predetermined value is a value determined corresponding to the default value of the feed per revolution of the printing paper after mark back end detection, and is defined as the sum of a criteria predetermined value and correction value. Here, a criteria predetermined value is set as  $10 / 30 = 0.333$  seconds, if a printing paper feed rate is 30mm/second when making the location of 10mm into a printing starting position for example, from the mark back end.

[0026] Correction value is for amending the variation of a photo cell 12, or degradation with the passage of time, and is mentioned later for details. It stands by until the counted value of a counter reaches a predetermined value at step 65, if a predetermined value is reached, it will progress to step 66, and a motor 51 is suspended, and paper feed is suspended. Finally a counter is reset at step 67 and this routine is ended.

[0027] Drawing 7 is the flow chart of the 1st amendment routine which a customer engineer starts using a maintenance tool 52, when a customer engineer judges that the printing gap has occurred. That is, printing paper delivery is started at step 70, and reading of the output of a photo cell 12 is started at step 71. And it judges whether falling was detected at step 72, i.e., was the first transition of a mark detected?

[0028] When a negative judging is carried out at step 72 (i.e., when the first transition of a mark is not detected), detection of return and the first transition of a mark is continued to step 71. On the contrary, when an affirmation judging is carried out at step 72 (i.e., when the first transition of a mark is detected), it progresses to step 73, and a counter is started in order to measure the die length of a mark. It judges whether the standup was detected at step 74, i.e., was the trailing edge of a mark detected?

[0029] When it stands by until the trailing edge of a mark was detected at step 74, and the first transition of a mark is detected, a counter is stopped at step 75. It is the actual multiplier value calcium of a counter at step 76. The count difference delta with the certified value Cr defined beforehand is computed based on a degree type.

$\text{delta} = \text{Cr} - \text{calcium}$  — here, a certified value is set as  $10 / 30 = 0.333$  seconds, if a printing paper feed rate is 30mm/second when for example, mark die length is 10mm.

[0030] Actual multiplier value calcium of now and a counter A count difference will be set to  $\text{delta} = 0.333 - 0.3 = 0.033$  if it assumes that it was 0.3 seconds. Correction value is calculated at step 77 using the function which makes the count difference delta an independent variable and which was defined beforehand.

[0031] That is, since printing paper is sent  $30\text{mm}[\text{/second}] \times 0.033\text{-second} = 1\text{mm}$  between count differences (= 0.033 seconds) in an above-mentioned case, it means that the mark with a die length of 10mm had originally been measured actually shorter by the variation or aging of a photo cell 12 with 9mm. Here, when the variation of a photo cell 12 or the effect of degradation with the passage of time assumes that it generates uniformly in first transition and a trailing edge, originally the printing starting position of 10mm will shift from a trailing edge 0.5mm ago. Therefore, time amount which takes correction value to send printing paper 0.5mm since 10.5mm, then a printing starting position turn into a location of normal in the amount of paper feeds after trailing-edge detection = what is necessary is to just be referred to as 0.017.

[0032] In this case, since it is set to correction value  $= 0.017 = 0.033/2$ , the function  $f(\text{delta})$  which makes the count difference delta an independent variable and which was defined beforehand is defined as follows.

At step 78, it is a predetermined value to the  $f(\text{delta}) = \text{delta}/2$  last. <- Criteria predetermined value + This routine is ended as correction value.

[0033] Since degradation of a photo cell 12 with the passage of time may be offered by the manufacturer as a function of activity accumulation time amount, it can also determine correction value as a function of activity accumulation time amount. Drawing 8 is the flow chart of the 2nd paper feed routine, and forms step 80 which computes the accumulating-totals time Tac of a photo cell between step 63 of the 1st paper feed routine, and step 64.

[0034] In addition, the step which sets a photo cell to ON in front of step 62, and the step which makes a photo cell off after rising edge detection may be added further. Drawing 9 is the flow chart of the 2nd amendment routine, calculates correction value at step 90 with the function g which makes the accumulating-totals time Tac an independent variable and which was defined beforehand,

and ends this routine.

[0035] Correction value  $\leftarrow g$  (Tac)

Above although the amount of paper feeds after trailing-edge detection is amended, it replaces with the amount of paper feeds after trailing-edge detection, and you may make it adjust the threshold voltage of a comparator 20. Drawing 10 is the block diagram of the control circuit of the 2nd printer with the amount amendment function of paper feeds used when amending the threshold voltage of a comparator 20, and the threshold voltage corresponding to correction value is outputted to an input terminal on another side of an operational amplifier 20 through DI/F213.

[0036] Threshold voltage is adjusted so that the mark length who is detected by the photo-cell and read into a microcomputer 21 by this configuration may become the die length (for example, 10mm) always defined beforehand.

[0037]

[Effect of the Invention] According to the printer with a location gap amendment function concerning the 1st thru/or the 3rd invention, when printing-position gap occurs, it becomes possible by measuring mark detection time amount in proofreading mode actuation, and performing amendment according to gap from the conventional time to cancel gap. According to the printer with a printing starting position gap amendment function concerning the 4th thru/or the 6th invention, when printing-position gap occurs, it becomes possible by performing amendment according to the accumulation operating time of a detection means in proofreading mode actuation to cancel gap.

---

[Translation done.]

**\* NOTICES \***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**CLAIMS**

---

[Claim(s)]

[Claim 1] A detection means to detect the mark of the die length which is printed in the direction of paper feed of printing paper and which was defined beforehand, A pulse-ized means to pulse-ize the output of said detection means as compared with a threshold, A marginal detection means to detect the first transition or the trailing edge of a mark during print mode actuation based on the output of said pulse-ized means, The positioning means which carries out paper feed time amount paper feed, and determines a predetermined location during print mode actuation after first transition or a trailing edge is detected by said marginal detection means, During proofreading mode actuation, it decides on mark detection time amount based on the output of said comparison means. The printer with a printing starting position gap amendment function possessing an amendment means to amend gap of the printing starting position determined by said positioning means based on a comparison result with the conventional time beforehand determined as this mark detection time amount.

[Claim 2] The printer with a printing starting position gap amendment function according to claim 1 which amends the paper feed time amount after said positioning means \*\*\*\* trailing edge is detected based on a comparison result with the conventional time by which said amendment means decided on mark detection time amount based on the output of said pulse-ized means, and was beforehand determined as this mark detection time amount during proofreading mode actuation.

[Claim 3] The printer with a printing starting position gap amendment function according to claim 1 by which said amendment means amends the threshold of said pulse-ized means based on a comparison result with the conventional time which decided on mark detection time amount based on the output of said pulse-ized means, and was beforehand determined as this mark detection time amount during proofreading mode actuation.

[Claim 4] The printer with a printing starting position gap amendment function according to claim 1 by which an operating-time accumulation means to accumulate the operating time of said detection means is further provided, and said amendment means amends gap of the printing starting position determined by said positioning means during proofreading mode actuation based on the operating time accumulated with said operating-time accumulation means.

[Claim 5] The printer with a printing starting position gap amendment function according to claim 4 which amends the paper feed time amount after said positioning means \*\*\*\* trailing edge is detected based on the operating time when said amendment means was accumulated with said operating-time accumulation means during proofreading mode actuation.

[Claim 6] The printer with a printing starting position gap amendment function according to claim 4 by which said amendment means amends the threshold of said pulse-ized means during proofreading mode actuation based on the operating time accumulated with said operating-time accumulation means.

---

[Translation done.]



**\* NOTICES \***

Japan Patent Office is not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**DESCRIPTION OF DRAWINGS**

---

[Brief Description of the Drawings]

[Drawing 1] It is the explanatory view of the mark detection approach.

[Drawing 2] It is the circuit diagram of a mark detection circuit.

[Drawing 3] It is a wave form chart at the time of mark detection.

[Drawing 4] It is the explanatory view of a technical problem.

[Drawing 5] It is the block diagram of the control circuit of the 1st printer with a printing starting position gap amendment function concerning this invention.

[Drawing 6] It is the flow chart of the 1st paper feed routine.

[Drawing 7] It is the flow chart of the 1st amendment routine.

[Drawing 8] It is the flow chart of the 2nd paper feed routine.

[Drawing 9] It is the flow chart of the 2nd amendment routine.

[Drawing 10] It is the block diagram of the control circuit of the 2nd printer with a printing starting position gap amendment function concerning this invention.

[Description of Notations]

12 -- Photo cell

121 -- Photodiode

122 -- Photo transistor

20 -- Operational amplifier

21 -- Microcomputer

51 -- Motor

52 -- Maintenance tool

---

[Translation done.]

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record.**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☒ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☒ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**